

HSP60 is muscle fiber-type specific and increases after endurance training: mice model

Rosario Barone¹, Filippo Macaluso¹, Claudia Sangiorgi¹, Daniela D'Amico¹, Elisa Dino¹, Alessandra Costa², Viviana Moresi², Coletti Dario^{2,3}, Sergio Adamo³, Felicia Farina¹, Valentina Di Felice¹ and Giovanni Zummo¹

¹ Dipartimento di Biomedicina Sperimentale e Neuroscienze Cliniche, Università degli Studi di Palermo, Italy

² Dipartimento di Scienze Anatomiche, Istologiche, Medico-legali e dell'Apparato Locomotore, SAPIENZA Università di Roma, Italy

³ Laboratory of Genetics and Physio-pathology of Muscle Tissues, UR4 - Ageing, Stress, Inflammation, University Pierre et Marie Curie Paris 6, France

Heat shock protein (Hsp) 60 plays a key role in the translocation of proteins and cytoprotection, is primarily localized inside mitochondrial, and its levels increase in skeletal muscle upon exercise (Folkesson et al., 2013). The aim of this study was to examine muscle fiber specificity of HSP60 at rest and after an endurance training program of 45 days. Forth-eight male young (7-weeks old) healthy mice (BALB/c) were subdivided into six groups (8 mice per group). Three groups were trained on a rota-rod, at a gradually increasing duration and speed; while the other three groups did not perform any type of regular physical activity. One group of each condition was sacrificed after 15, 30 and 45 days. Forth-eight hours after the last exercise session all mice were sacrificed by cervical dislocation and posterior muscles group of hindlimb (gastrocnemius, soleus and plantaris) were dissected, weighed and embedded into paraffin or frozen in liquid nitrogen. Immunohistochemistry and immunofluorescence analysis showed that skeletal muscle type I fiber expressed high levels of Hsp60. The western blotting analyses of the entire posterior muscle group did not show any difference in the protein levels after endurance training, while the analysis of soleus muscle (reach in type I fibers) showed an over expression of Hsp60 after 30 and 45 days of endurance training. These data indicated that Hsp60 is muscle fibre type-specific. This may be due to the differences in mitochondrial content between slow and fast fibres. Anyway Hsp60 may be localized also in the cytoplasm, in the outer membrane, in the interstitium and in the blood stream, hence the role of this protein in endurance training need be elucidated.

References

- [1] Folkesson M, Mackey AL, Langberg H, Oskarsson E, Piehl-Aulin K, Henriksson J, Kadi F (2013) The expression of heat shock protein in human skeletal muscle: effects of muscle fibre phenotype and training background. *Acta Physiol* 209(1): 26-33.

Key words

Heat shock protein 60, skeletal muscle, endurance exercise.